Macallen Dam Feasibility and Impact Analysis

Dam Committee Update Meeting

Lamprey River, Newmarket, NH

Presented By:
Gary Lemay, E.I.T.,
Mark Wamser, P.E.
Gomez and Sullivan Engineers

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GOMEZ AND SULLIVAN Engineers, P.C.

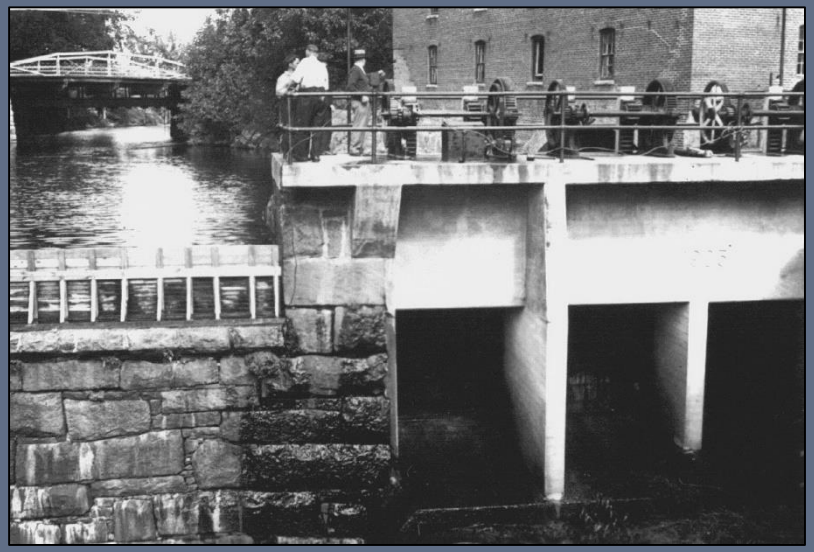
Agenda

- Introduction/Overview: Why the Town is studying dam removal
- Feasibility Study Update
  - Preliminary hydraulic model results
  - Preliminary dam removal cost estimate
  - Draft report status
- Status of CLF Grant Extension
- Public Education/Outreach
- Update on NHDOT hydraulic modeling meeting
- Other Business
- Adjourn

Project Introduction and Overview

Why is the town evaluating dam removal?

- NH DES sent a Letter of Deficiency (LOD) requiring dam repairs and noting inadequate spillway capacity.
- Dam cannot pass 100-yr flood (10,259 cfs) with one foot of freeboard, as required by NHDES Dam Bureau dam safety requirements. NHDES concerned that dam failure could result in loss of life.
- Dam modifications are needed to pass the 100-yr flood.
- Following recent (2006, 2007, 2010) flooding, some Newmarket residents petitioned the Town Council to evaluate dam removal as an option to dam modification. Passed
- Wright-Pierce conducted a study to review dam modification alternatives.



Project Update

Hydraulic Modeling Introduction

- Hydraulic models are used to predict the width, depth and velocity of the river under a range of flows and conditions (dam-in and dam-out).
- Hydraulic model inputs include: dam spillway/gates/abutments, bridges, river cross-sections, road profiles (flow split), and channel roughness
- River cross-sections were developed from previously collected bathymetric data and upland topography.
- Once model is calibrated to observed conditions it is used to simulate different conditions (dam-in and dam-out) under a range of flows.
- Model outputs- inundation maps and channel profiles.
- Gomez and Sullivan developed a new hydraulic model of the Macallen Dam impoundment

Hydraulic Modeling

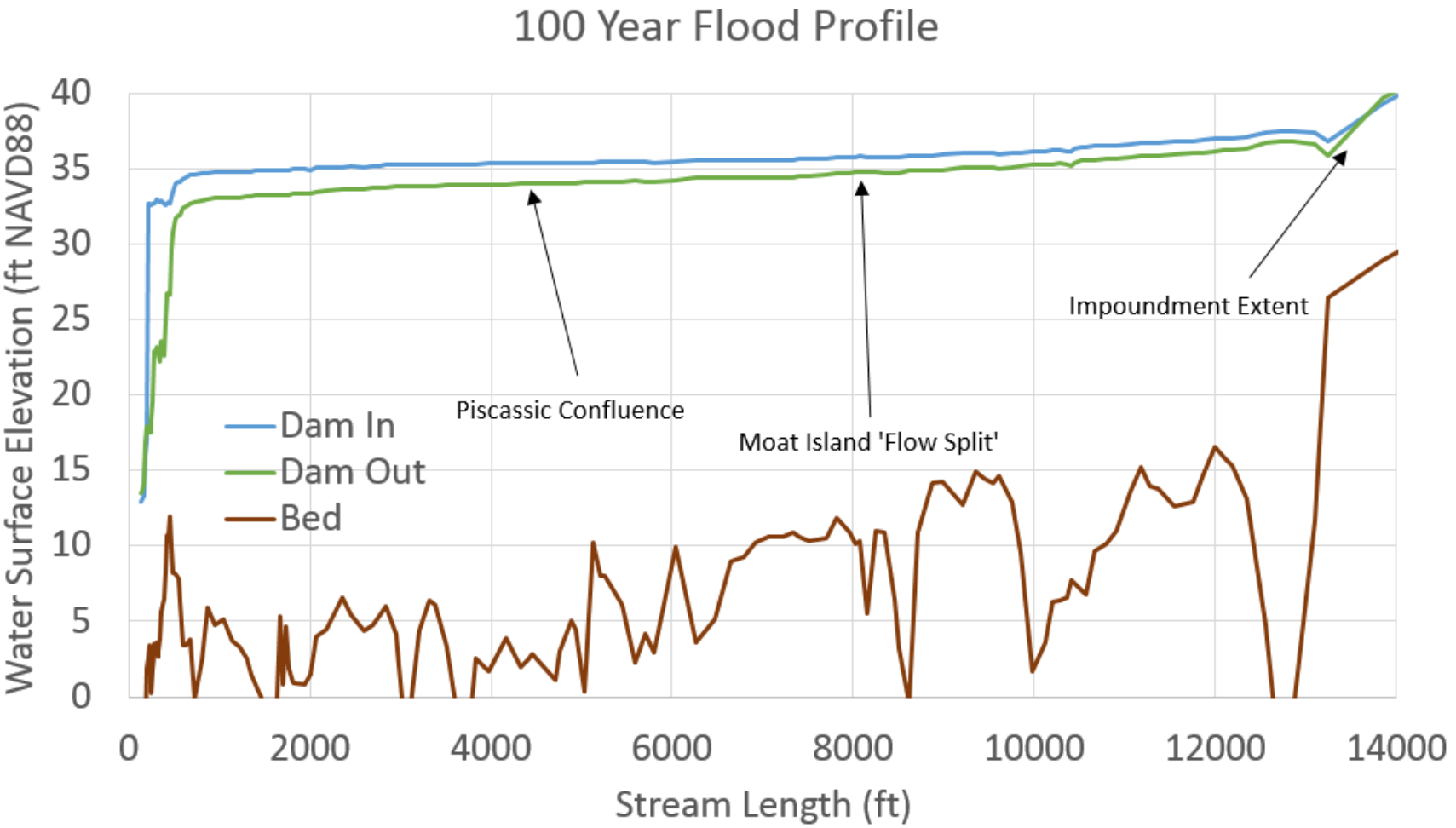
- Results presented today are preliminary, and are subject to further internal and external review before results are finalized
- Calibration flows – used to "tune" model to observed water surface elevation and flows
  - Limited publically available calibration data
  - April 2007 and March 2010 events – High Water Line near DBC (Scholz thesis), NHDES photographs of Veteran's bridge and Macallen Dam (2010 only)
- Further calibration of the model is on-going, although findings contained in this presentation are not likely to change drastically
- Evaluated 100-year flow, average daily flow for dam-in and dam-out conditions
- The model includes hydraulic influences due to the Macallen Dam, Veteran's Bridge, and Rte 108 flow split

Hydraulic Modeling – 100-year Flow- Preliminary Findings

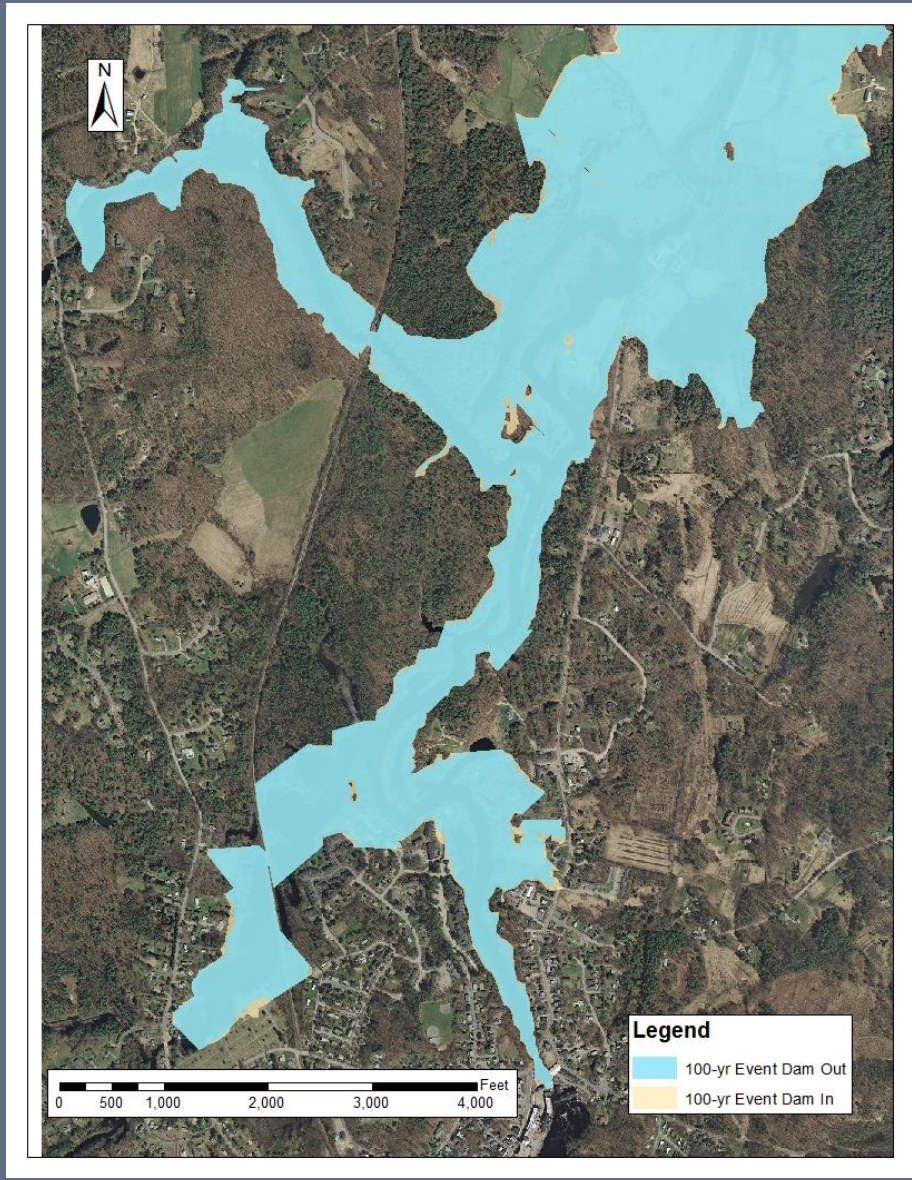
- Wright-Pierce 100-yr flood flow (10,260 cfs @ Macallen Dam)
- Hydraulic control at Veteran's Bridge under dam-in and dam-out conditions
- Dam-out conditions appears to lower 100-year flood levels upstream of the Veteran's Bridge by approximately 1-foot
  - Slightly more reduction closer to the dam, slightly less reduction farther upstream of the dam
- Dam-in conditions shows Veteran's Bridge causing a slightly greater constriction than observations indicate – will evaluate further.
- Removing the dam decreases the amount of water diverted to the Oyster River, increasing the flow at Macallen Dam
  - Flow at Macallen Dam is ~11,607 cfs instead of 10,260 cfs
  - Specific numbers may change depending on final model calibration

Hydraulic Modeling – 100-year Flow

- Wright-Pierce 100-yr flood flow (10,260 cfs @ Macallen Dam)



Hydraulic Modeling – 100-year Flow

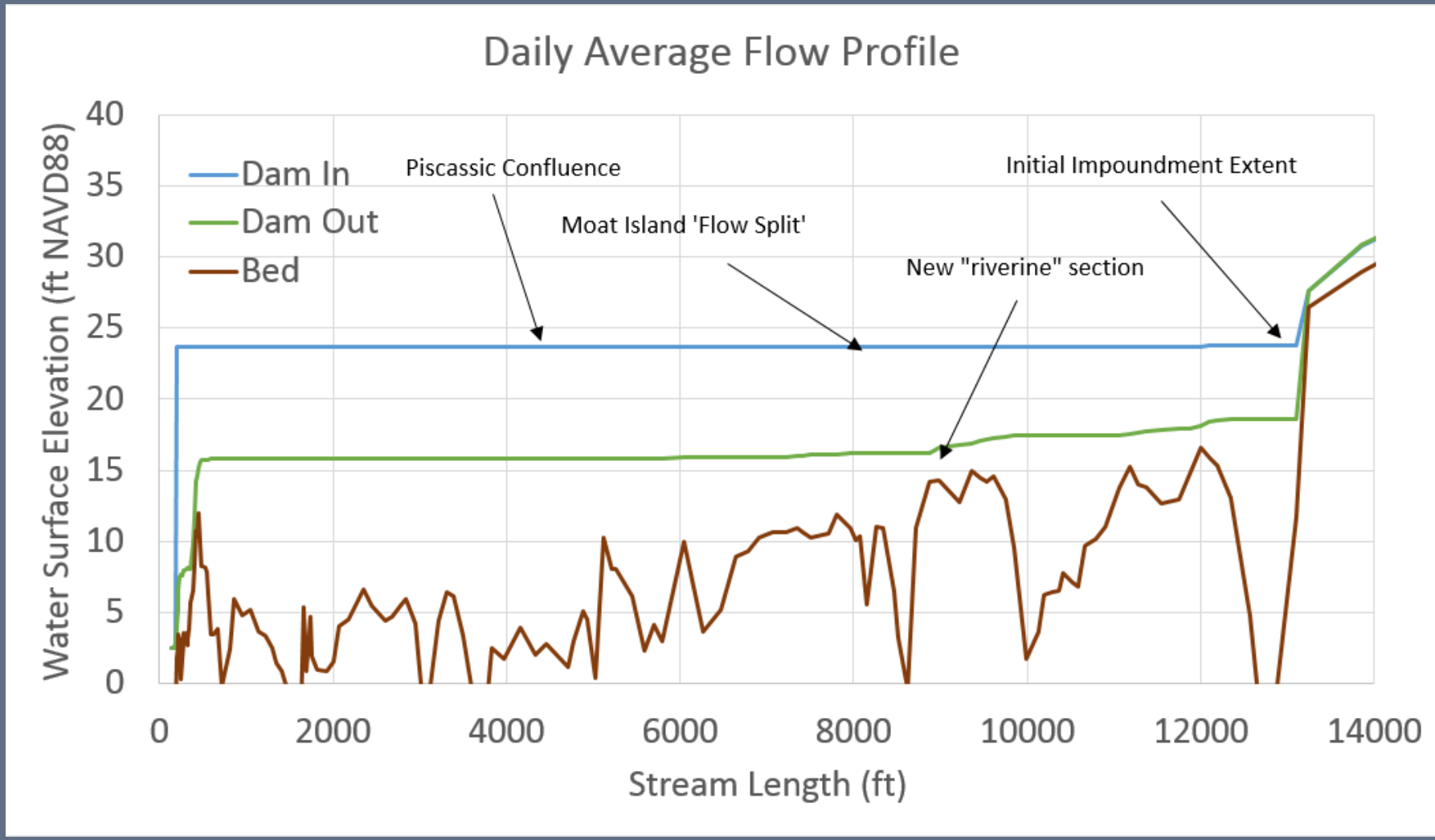


Hydraulic Modeling – Daily Average Flow

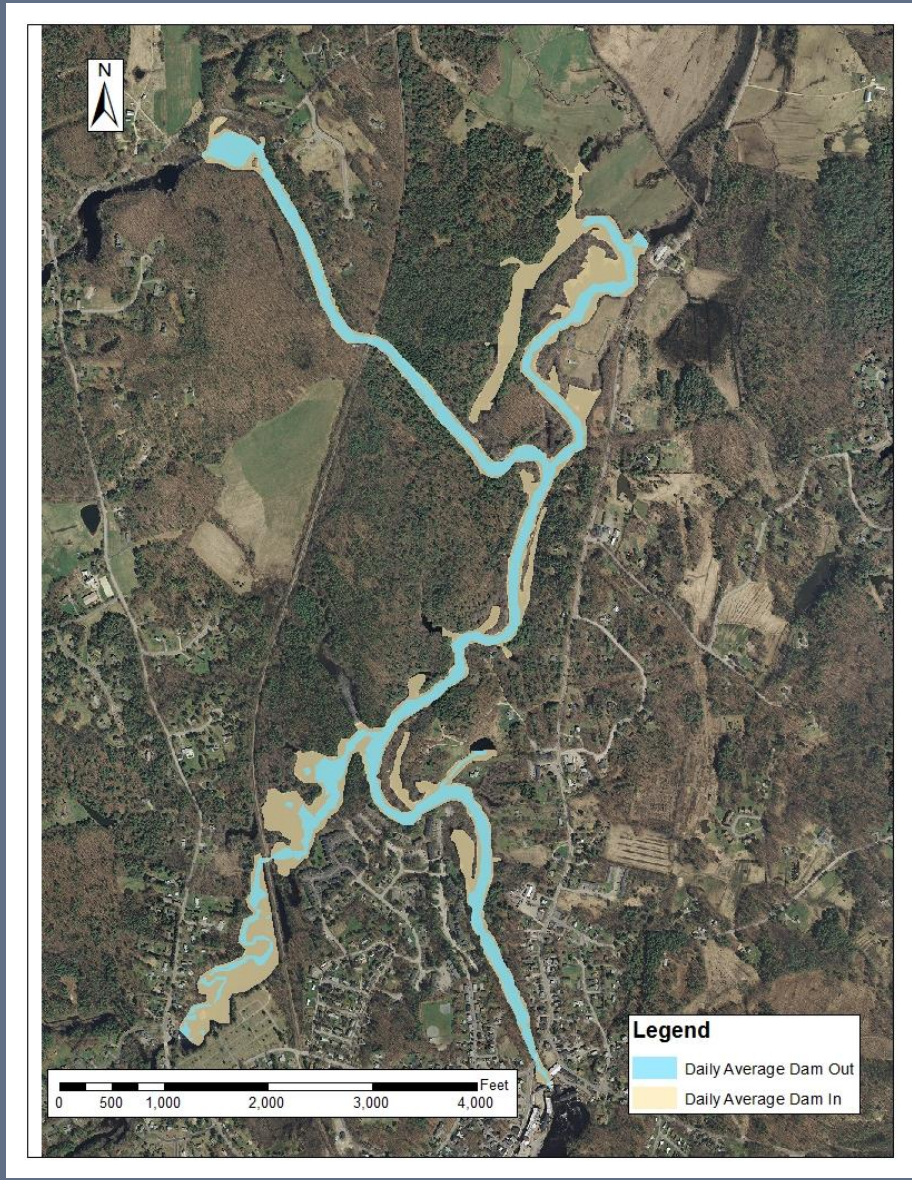
- Daily Average Flow (337 cfs @ Macallen Dam)
- Hydraulic control due to bedrock outcrop under Veteran's bridge
- Dam-out lowers water surface elevations upstream of the Veteran's Bridge by approximately 5 to 8 feet from dam-in conditions
  - More reduction closer to the dam, less reduction farther upstream of the dam in the "riverine" section
  - Assumes no bed down-cutting due from increased water velocities

Hydraulic Modeling – Daily Average Flow

- Daily Average Flow (337 cfs @ Macallen Dam)



Hydraulic Modeling – Daily Average Flow



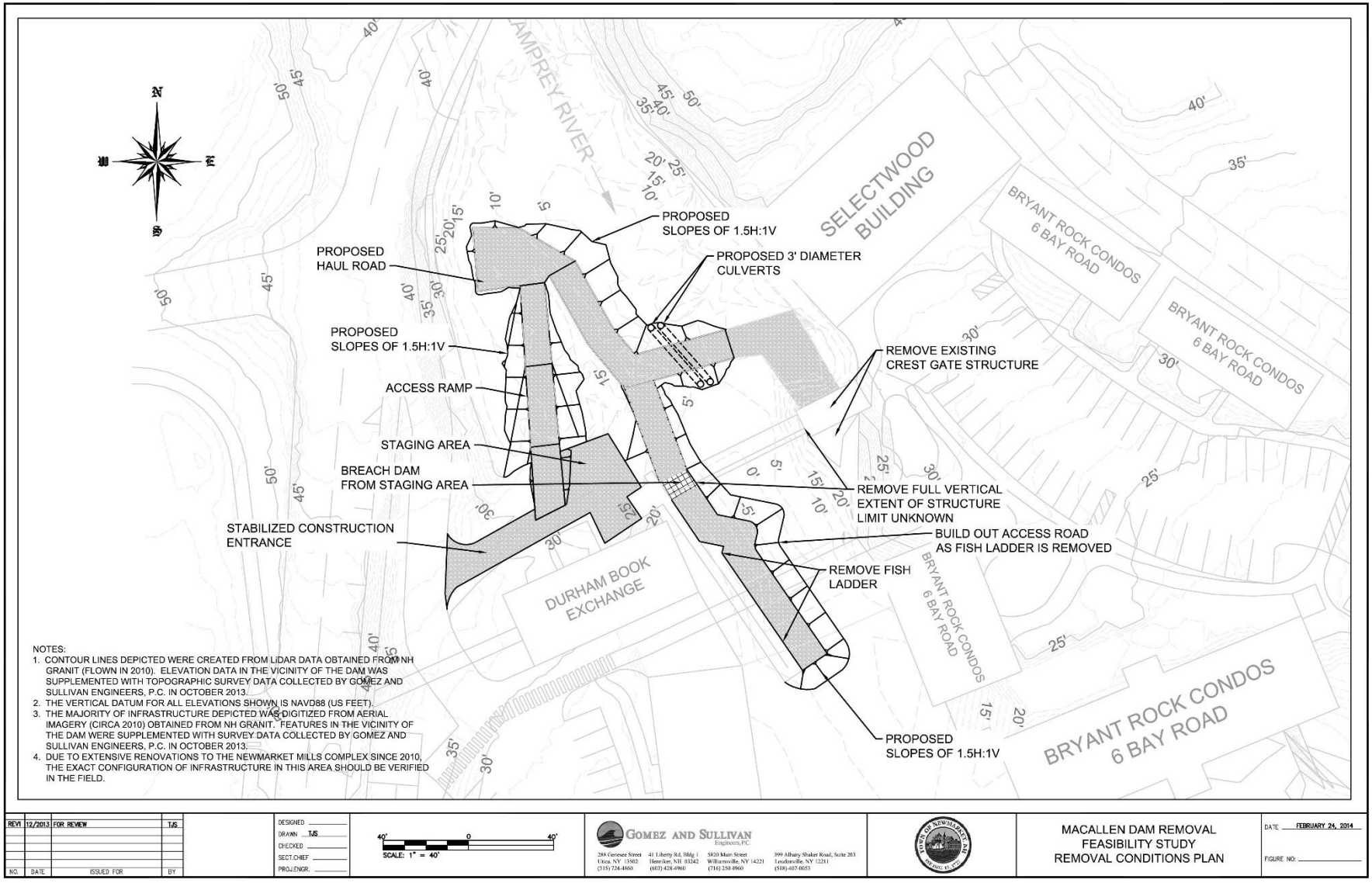
Dam Removal Cost and Construction Plan

- Construction sequence:
  - Slowly lower impoundment via spill gates (~0.5 ft/day)
  - Install sediment/erosion control, construction entrance, oil boom and vibration monitoring equipment
  - Lower right abutment and breach the spillway via an excavator, remove concrete connection to right abutment building
  - Build access road with temporary flow passage culvert
  - Remove gate structure and plateau, leave retaining wall in place
  - Remove remaining spillway, move downstream and remove fish ladder
  - Remove temporary access road
  - Seed/stabilize the construction area
- Estimated total cost of $740,000
- This estimate includes many assumptions and has some missing pieces (see next slide)

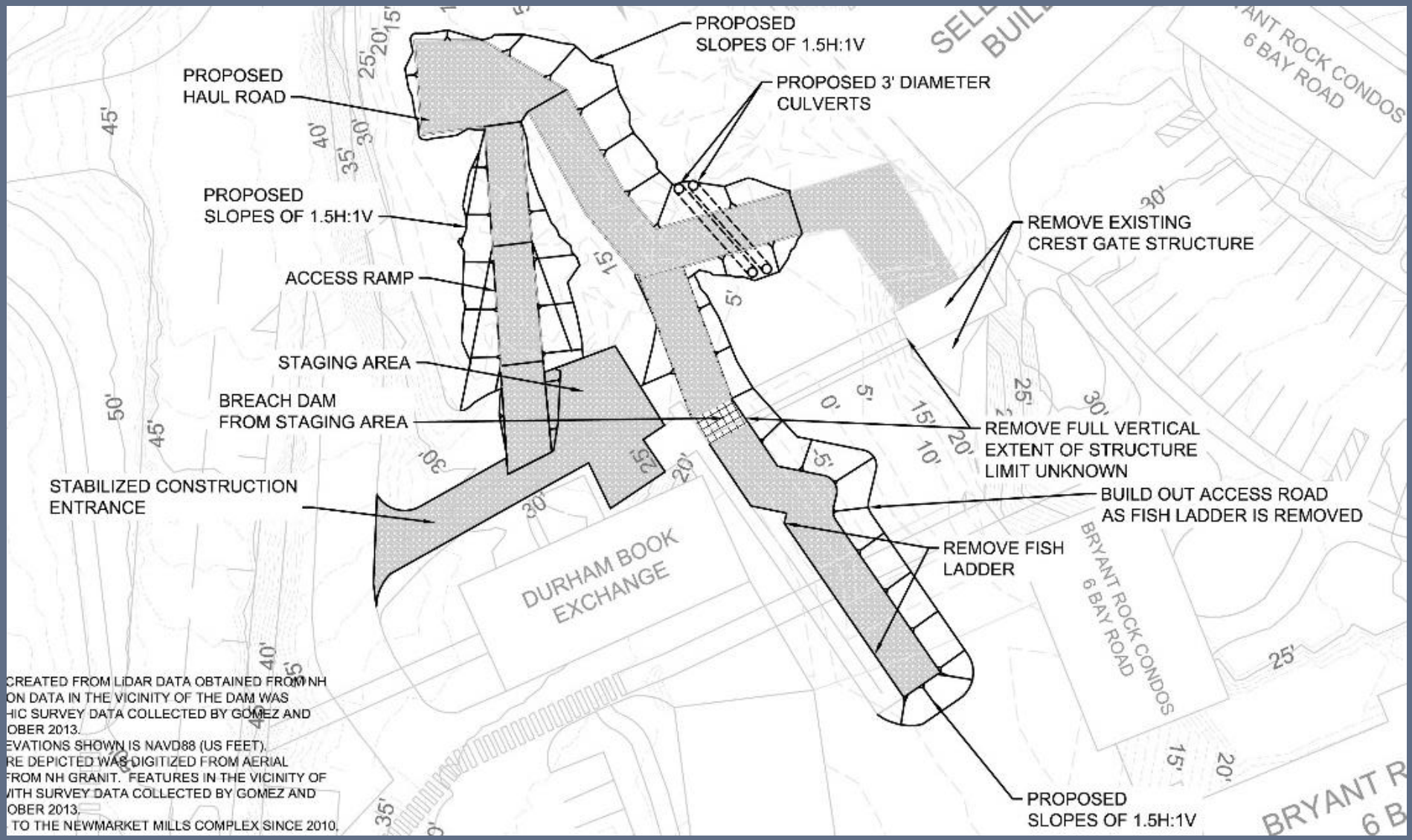
Dam Removal Cost and Construction Plan

- Assumptions and remaining pieces
  - Does not include cost to conduct remaining feasibility study
  - "Clean" sediment, allowed to mobilize and move downstream
    - Contaminated sediments would greatly drive up cost
  - No structural/stability analysis completed for Piscassic railroad bridge
    - We have assumed no further work will be done.
    - HTA did not conduct a structural investigation or scour analysis of this bridge
  - Assumes no further bedrock work necessary to allow fish passage

Dam Removal Cost and Construction Plan



Dam Removal Cost and Construction Plan



Draft Report Status Update

- Draft report is underway
- Anticipate submitting initial draft to Project Partners by end of April 2014


QUESTIONS?